ASSIGNMENT 1

Textbook Assignment: "Environmental Satellites," chapter 1, pages 1-1 through 1-37,"Weather Radar," chapter 2, pages 2-1 through 2-55.

1-1. Geostationary satellites have inclination angles of how many degrees?

1. 0°
2. 15°
3. 90°
4. 360°

1-2. Which term best describes the orbit of a satellite which crosses the equator at the same Local Mean Time (LMT) on each orbit?

1. Polar-orbiting
2. Geostationary
3. Sun-synchronous
4. Earth-synchronous

1-3. If a polar-orbiting satellite had an ascending node time of 1500L, what would be the approximate descending node time at the same location?

1. 0000
2. 0300
3. 1200
4. 1500

1-4. Which of the following terms is used to describe a satellite's closest position relative to the earth?

1. Ascending node
2. Inclination angle
3. Perigee
4. Nadir

1-5. The Department of Defense operates which of the following meteorological satellite programs?

1. DMSP
2. NOAA
3. GOES
4. TIROS-N

1-6. Which of the following characteristics is an advantage of polar-orbiting satellites?

1. They generally provide higher resolution than geostationary satellites
2. They are well suited for oceanographic applications
3. They provide coverage for high-latitude regions
4. All of the above

1-7. Which of the following characteristics is a major advantage of geostationary satellites over polar-orbiting satellites?

1. Image resolution
2. System cost
3. System life expectancy
4. Frequency of image transmission

1-8. A rapidly moving large-scale disturbance would be best tracked by which satellite?

1. DMSP
2. NOAA 14
3. GOES 8
4. METEOR

1-9. Which of the following areas would provide the highest spatial resolution?

1. 0.8 kilometers
2. 3.5 kilometers
3. 8.0 nautical miles
4. 15.0 nautical miles

1-10. When using visual-range images, areas of low reflected light appear black, while areas of high reflected light appear white.

1. True
2. False

1-11. Which of the following areas would have the lowest albedo?

1. Polar regions
2. Forest regions
3. Desert areas
4. Areas of intense convective activity

1-12. Infrared imagery measures which of the following properties?

1. Temperature
2. Humidity
3. Reflectivity
4. Composition

1-13. Infrared imagery would be very helpful in identifying which of the following features?

1. Low-level jets
2. Ice/snow cover
3. Cirrus
4. Stratus

1-14. Water vapor imagery would be very helpful in identifying which of the following features?

1. Coastal stratus
2. Low-level jets
3. Ice/snow cover
4. Nimbostratus

1-15. What term describes the assignment of specific colors or gray shades to satellite imagery?

1. Resolution
2. Enhancement
3. Distortion
4. Brilliance

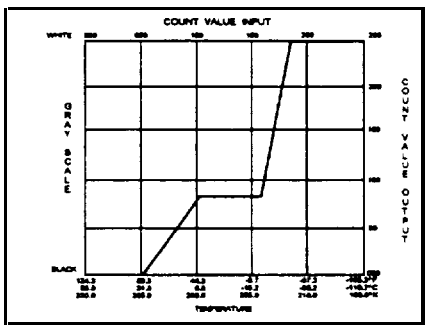

Figure 1-A

IN ANSWERING QUESTION 1-16, REFER TO FIGURE 1-A.

1-16. What type of enhancement curve is depicted?

1. Single
2. Split
3. High-low
4. MB pre-defined

1-17. A temperature scale is superimposed over the gray-scale at the top of most GOES infrared images. What is the temperature interval of these lines?

1. 1°C
2. 2°C
3. 5°C
4. 10°C

1-18. Which of the following types of imagery is available via NODDS?

1. DMSP
2. GOES
3. METEOR
4. METEOSAT

1-19. GOES-TAP imagery is obtained via which of the following methods?

1. Dedicated telephone lines
2. HF broadcast
3. Direct satellite link
4. Wideband link

1-20. What type(s) of imagery is/are normally available on the APT service from NOAA's polar orbiting environmental satellites?

1. Visual only
2. Infrared only
3. Both visual and infrared at all times
4. Infrared at all times, plus visual imagery when over sunlight areas

1-21. Considering direct readout services, the IMOSS Satellite Module can receive and process only APT imagery, while the SMQ-11 can process APT, HRPT, or DMSP imagery.

1. True
2. False

1-22. WEFAX imagery can be obtained directly from which of the following sources?

1. Internet
2. NOAA satellites
3. GOES satellites
4. DMSP satellites

1-23. What is the fastest method of acquiring a wide variety of satellite imagery?

1. WEFAX broadcast
2. HF broadcast
3. Internet
4. AUTODIN

1-24. At most sites, the AN/SMQ-11 is cross-connected and controlled from what equipment?

1. WEFAX antenna
2. IMOSS
3. TESS
4. MIDDS

1-25. On the MOSS SAT MOD, how often must the operator update ephemeris data for each polar-orbiting satellite?

1. Daily
2. Every 4 days
3. Once a week
4. Once every 2 weeks

1-26. What kind of data defines type, orientation, and shape of a satellite's orbit?

1. Epoch
2. Inclination
3. Nodal
4. Ephemeris

1-27. In addition to providing information critical for calculations of antenna-aiming data, ephemeris data is used by satellite receiver systems for what, if any, of the following?

1. To allow the system to automatically turn itself on and off to copy satellite passes
2. To allow the system to earth-locate the image and merge a location grid
3. To provide passwords that allow the system to pass commands to the satellite
4. None of the above

1-28. Which part of the NOAA APT Predict bulletin (TBUS) contains the ephemeris data required by IMOSS?

1. Part 1
2. Part II (day and night)
3. Part III (day and night)
4. Part IV

1-29. What does the first column in a C-element orbital prediction message indicate?

1. The satellite number
2. The epoch date
3. The mean motion
4. The inclination angle

1-30. When data is used from a Satellite Equator Crossings message, how often must the SMQ-11 be updated?

1. Daily
2. Every 2 days
3. Weekly
4. Every 2 weeks

1-31. The polarization of an electromagnetic wave is referenced to which of the following components?

1. The electrical field
2. The magnetic field
3. The complete sine wave
4. The radar echo

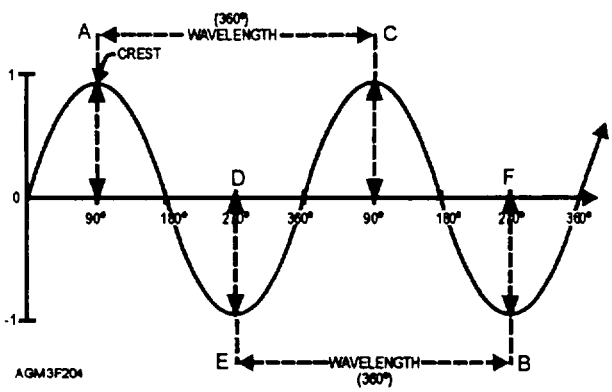

Figure 1-B

IN ANSWERING QUESTIONS 1-32 and 1-33, REFER TO FIGURE 1-B. THIS FIGURE REPRESENTS AN ELECTROMAGNETIC SINE WAVE.

1-32. Which line segment represents a measurement of wavelength?

1. A-B
2. A-C
3. D-E
4. D-F

1-33. Which line segment represents a measurement of amplitude?

1. A-B
2. A-C
3. D-E
4. D-F

1-34. Which of the following frequencies has the shortest wavelength?

1. 105 Kilohertz
2. 80 Megahertz
3. 5 Gigahertz
4. 200 Gigahertz

1-35. Which of the following would have the greatest reflectivity?

1. Dust
2. Hail
3. Drizzle
4. Snow

1-36. Which of the following pulse lengths would provide the best range resolution?

1. 1.57 microseconds
2. 4.50 microseconds
3. 0.75 seconds
4. 1.50 seconds

1-37. The maximum range of a radar is determined by which of the following factors?

1. The pulse length of the radar
2. The range resolution of the radar
3. The pulse repetition frequency of the radar
4. The amplitude of the radar wave

1-38. What would be the maximum unambiguous range of a radar with a pulse repetition frequency (PRF) of 750?

1. 62 miles
2. 124 miles
3. 248 miles
4. 496 miles

1-39. Range folding occurs when back scattered energy from a target reaches the radar

1. while another pulse is being transmitted.
2. after another pulse has been transmitted.
3. before another pulse is transmitted.

1-40. As range to a target increases, what happens to (a) the radar's pulse volume, and (b) the power of the radar pulse?

1. (a) increases (b) increases
2. (a) increases (b) decreases
3. (a) decreases (b) decreases
4. (a) decreases (b) increases

1-41. Assuming two targets are equidistant from a radar, how far must they be apart in order for the radar to detect them separately?

1. One-half pulse length
2. More than one pulse length
3. One-half beam width
4. More than one beam width

1-42. Which element has the most significant impact on the refraction of radar waves?

1. Wind
2. Pressure
3. Moisture
4. Temperature

1-43. Under normal refractive conditions, N-values will

1. increase with height.
2. decrease with height.
3. remain equal with height.

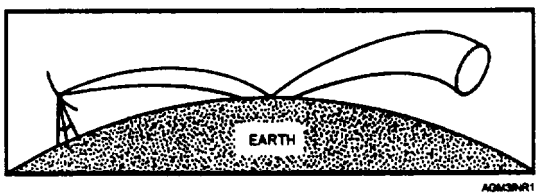

Figure 1-C

IN ANSWERING QUESTION 1-44, REFER TO FIGURE 1-C.

1-44. What type of refractive condition is depicted?

1. Normal
2. Subrefraction
3. Superrefraction
4. Ducting

1-45. Which of the following conditions produces a net gain of returned radar energy?

1. Back scattering
2. Scattering
3. Absorption
4. Attenuation

1-46. Which of the following effects may produce anomalous reflectivity returns that have a "baseball bat" appearance?

1. Solar radiation
2. Diffraction
3. Refraction
4. Ground clutter

1-47. What is the most important advantage of Doppler radar over conventional radar?

1. Doppler radars can produce more power and higher energy returns
2. Doppler radars have higher sensitivity thresholds
3. Doppler radars provide target motion and velocity measurements
4. Doppler radars are easier to maintain

1-48. What does a Doppler radar actually measure?

1. Frequency shifts
2. Phase shifts
3. Amplitude shifts
4. Decibel shifts

1-49. When a parcel with a true velocity of 50 knots is moving perpendicular to the WSR-88D antenna beam, what velocity is computed by the radar?

1. 0 knots
2. 10 knots
3. 25 knots
4. 50 knots

1-50. Velocity aliasing occurs during which of the following situations?

1. A phase shift occurs that is 90° or larger
2. A phase shift occurs that is less than 90°
3. A phase shift occurs that is 180° or larger
4. A phase shift occurs that is less than 180°

1-51. What would be the Nyquist velocity of a WSR-88D radar operating with a PRF of 800?

1. 36.3 knots
2. 41.5 knots
3. 83.0 knots
4. 110.8 knots

1-52. Which of the following statements best describes the Doppler Dilemma?

1. It is the trade-off between radar frequency and wavelength
2. It is the trade-off between pulse volume and power
3. It is the trade-off where an increase in PRF increases the maximum unambiguous velocity but decreases the maximum unambiguous range
4. It is the trade-off where an increase in PRF decreases the maximum unambiguous velocity but increases the maximum unambiguous range

1-53. What is the primary function of the Radar Data Acquisition (RDA)?

1. To ensure synchronization between the receiver and signal processor
2. To collect returning radar energy to produce base products
3. To perform clutter filtering on all transmitted signals
4. To display derived products

1-54. Which of the following radar moments would be used to evaluate the intensity of hail?

1. Reflectivity
2. Velocity
3. Spectrum width
4. All of the above

1-55. Which component of the WSR-88D creates derived products?

1. RDA
2. RPG
3. PUP
4. UCP

1-56. Which component of the WSR-88D is used to time-lapse radar products?

1. RDA
2. RPG
3. PUP
4. UCP

1-57. Radar products that are near-real images are know by what term?

1. Derived products
2. Principal user products
3. Spectrum width products
4. Base products

1-58. Most Navy and Marine Corps weather stations equipped with a PUP workstation are classified as what type of user?

1. Principal Users, External Sources (PUES)
2. Nonassociated Principal Users (NAVPUPs)
3. Associated Principal Users (APUPs)
4. External Users

1-59. Which of the following terms best describes a WSR-88D product based on multiple elevation scans?

1. A base product
2. A VCP product
3. A "slice" product
4. A volumetric product

1-60. Which Volume Coverage Pattern (VCP) should be used during severe weather events?

1. VCP 11
2. VCP 21
3. VCP 31
4. VCP 32

1-61. Which Volume Coverage pattern (VCP) should be used on cloudy days with strong gusty winds?

1. VCP 11
2. VCP 21
3. VCP 31
4. VCP 32

1-62. The most often used WSR-88D products at your office would normally be obtained via which of the following methods?

1. One-time Request (OTR)
2. Routine Product Set (RPS)
3. Alert-paired product request
4. Wideband link

1-63. Which products are given the highest generation priority by the RPG?

1. RPS products
2. OTR products
3. Alert-paired products
4. Narrow band link products

1-64. It is difficult to distinguish precipitation type from the Base Reflectivity (REF) product.

1. True
2. False

1-65. How are range folded areas depicted on the Base Reflectivity (REF) product?

1. Green shading
2. Purple shading
3. White shading
4. Range folded areas cannot be displayed on the Base Reflectivity (REF) product

1-66. What might the appearance of a hook echo signature indicate on the Base Reflectivity (REF) product?

1. A tornado
2. A dry line boundary
3. A severe hail event
4. A gust front

1-67. Reflectivity values of less than 18.5 dBZ on the Base Reflectivity (REF) product probably indicate which of the following phenomena?

1. Tornadic activity
2. Rain showers
3. Hail
4. Clouds

1-68. The zero-Doppler line on the Base Velocity (VEL) product is an indicator that no motion is occurring in that region of the atmosphere?

1. True
2. False

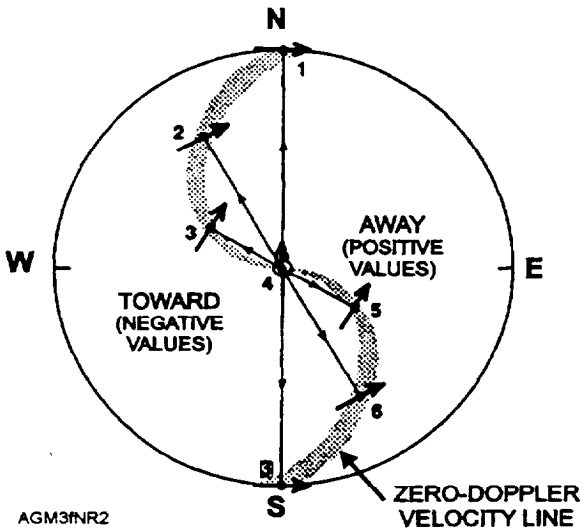

Figure 1-D

WHEN ANSWERING QUESTION 1-69, REFER TO FIGURE 1-D. THIS FIGURE REPRESENTS A BASIC INTERPRETATION OF A DOPPLER VELOCITY DISPLAY.

1-69. What is the direction of motion indicated at point X?

1. 030°
2. 120°
3. 210°
4. 300°

1-70. What is the primary purpose of the Vertically Integrated Liquid (VIL) product?

1. Provide accurate measurement of rainfall totals
2. Evaluate storm severity
3. Determine precipitation type
4. Indicate hail potential

1-71. Climb winds for pilot briefings can be obtained from which of the following WSR-88D products?

1. SWP
2. REF
3. VWP
4. VIL

1-72. What might a rapid collapse of a storm top on the Echo Tops (ET) product indicate?

1. A downburst
2. A developing thunderstorm
3. Tornadic activity
4. Supercell formation

1-73. The mesocyclone (MESO) algorithm is designed to evaluate which phenomena?

1. Hail size
2. Thunderstorm development
3. Wind velocity
4. Wind shear

1-74. How are areas of hail indicated on the Hail Index (HI) product?

1. Purple shading
2. Red triangle
3. Green triangle
4. Negative numbers

1-75. What is the main purpose of cross-section products?

1. They allow for the measurement of cloud bases and tops
2. They allow for the detection of turbulence
3. They allow a vertical depiction of the atmosphere by compiling base data vertically
4. They allow a horizontal depiction of the atmosphere by compiling base data horizontally